

MEMORANDUM FOR: Joseph G. Evjen
Project Coordinator

FROM: Charles W. Challstrom
Director, National Geodetic Survey

SUBJECT: INSTRUCTIONS: HONDURAS HARN, 2001
(GPS-1531)
Task Numbers: BP1BHM11 = Honduras HARN
BP1BHM21 = Nicaragua ties

GENERAL:

The National Geodetic Survey (NGS) is tasked to develop a modern Central American geodetic reference system in accordance with the Department of Commerce "Implementation Plan for Reconstruction Work in Central America." As part of this effort, NGS will work with the Instituto Geográfico Nacional (IGN) in Honduras to establish approximately 30 High Accuracy Reference Network (HARN) geodetic control stations. In Nicaragua, NGS will cooperate with the Instituto Nicaragüense de Estudios Territoriales (INETER) to tie their existing GPS survey to the newly-established Continuously Operating Reference Station (CORS) network.

PURPOSE:

This survey will provide the spatial framework for precision air, sea, and land navigation, mapping and charting, resource management, disaster relief, engineering and cadastral surveys, and Geographic Information Systems, and will contribute to the framework for an Inter-American Geospatial Data Network. Technology transfer, including one-on-one training in survey design, data acquisition, and processing, will help to promote a sustainable data infrastructure.

DATA ACQUISITION:

Data acquisition teams will include one person each from NGS and IGN. Utilize every available opportunity to conduct training.

The following procedures shall be used to attain 2-centimeter local accuracies in horizontal position and ellipsoidal height:

N/NGS21:JGEvjen:713-3194:amg:11-22-00
A:\FBN_HO-FINAL

Acquire all GPS data in compressed mode with 15-second epoch intervals and 10-degree elevation mask angles. The GPS receivers must record both L1 & L2 full wavelength carrier signals.

Whenever feasible, especially in eastern Honduras, operate the GPS receivers as Central Temporary CORS (CT-CORS). These receivers shall acquire data at 30-second epoch intervals for a minimum of 72 continuous hours.

A list and sketch of proposed HARN stations is provided. Project plans shall be maintained on the NGS website:

<http://www.ngs.noaa.gov/PROJECTS/Mitch/Honduras/>

For each Honduras HARN station:

- < Perform at least three each, 5½-hour GPS observations. The start times for these observations shall include at least one shift of 4 hours.
- < Ties to two bench marks shall be included.
- < At least one direct tie to adjacent HARN stations should be performed by simultaneous observation.
- < At least half of all base lines shall be repeated.
- < Complete one each Visibility and Recovery Forms per station. Complete one GPS Observation Log per observation. Acquire digital images of the station monument and antenna set-up.

For each Nicaragua tie station:

- < Perform at least two each, 5½-hour GPS observations. Shift the start time for the second observation by 4 hours.
- < Complete one each Visibility and Recovery Forms per station. Complete one GPS Observation Log per observation. Acquire digital images of the station monument and antenna set-up.

All observers shall carefully monitor their survey equipment. During antenna set-up, plumbing bubbles must be shaded for 3 minutes before plumbing or checking. Calibrate all tripods and tribrachs at the beginning and end of the project. Fixed-height tripods are preferred for all observations.

Conduct all field activities with due regard for the safety of personnel and equipment. Tower contact is mandatory at all controlled airports. Avoid taking photographs in the vicinity of military compounds without consent from local authorities. This project will be performed under the technical management of NGS. If data quality is questionable, notify N/NGS21 immediately and send data via express delivery for office review. The survey team shall not depart the project area until they have quality reviewed all data, advised N/NGS21, and notified N/NGS41.

DATA PROCESSING:

Personnel from N/NGS412 and N/NGS22 will share responsibility for data processing. Involve IGN personnel at every opportunity for training purposes.

Use PAGES software for vector computations, data management, and quality review. Compute vectors in the most current epoch of the International Earth Rotation Service (IERS) Terrestrial Reference Frame (ITRF) system, using 30-second epoch intervals, 15 degree elevation mask angles, default meteorological models, and precise ephemerides from the International GPS Service (IGS).

Vectors greater than 10 km in length shall be computed in an ion-free, fixed or partially-fixed solution. Vectors less than 10 km in length shall be computed in a L1 fixed solution, computed separately from the long vector solution.

Process the CORS and CT-CORS data in 24-hour sessions, using the PAGES fixed base line option. Use the CORS monument position when available, otherwise use the Antenna Reference Point (ARP).

Write station descriptions in both English and Spanish using WDDPROC software. Station photographs should show antenna set-up, monument detail, significant obstructions, and

cardinal directions. The preferred image format is JPEG, 1MB or smaller. The preferred naming convention is the 4 character ID plus the PID as an extension. Example: ANNETTE ISLAND 1 = AIS1.AF9530

Data quality shall be monitored with analysis of PAGES plots, repeated vectors, loop misclosures, free adjustment residuals, and COMPGb, OBSCHK, OBSDES, and CHKDESC software. Success in meeting the accuracy standards will be proven by measurement repeatability and adjustment residuals.

DATA TRANSMITTAL:

General data format and digital file definitions are described in "Input Formats and Specifications of the NGS Data Base" Volume I, Horizontal Control Data, Federal Geodetic Control Subcommittee, September 1994, revised and reprinted November 1998. Include all deliverables listed in Annex L - "Guidelines for Submitting GPS Relative Positioning Data." Label all data with the following:

Title:	HONDURAS HARN, 2001
Accession number:	GPS-1531
Submission ID:	hoha011d.805

Do not release any data unless approved by IGN or INETER. Archive copies of transmitted data until notification by N/NGS41.

LIAISON:

Field personnel shall advise the Project Coordinator of their location, planned itinerary, and contact information at all times. Contact the following personnel as necessary:

United States Embassy Consulate in Honduras:

Avenida La Paz, Apartado Postal #3453, Tegucigalpa,
Honduras
PH: 504.236.9320, FAX: 504.238.4357, EMERGENCY:
504.236.9325

Instituto Geográfico Nacional (IGN) :

Dr. Noé Pineda Portillo, Director General, IGN
Apartado Postal 20706, Comayaguela, Honduras
PH: 504.225.2759, FAX: 504.225.4789, ignhon@sdnhon.org.hn

Instituto Nicaragüense de Estudios Territoriales (INETER) :
Ing. Claudio Gutiérrez Huete, Director
Apartado Postal 2110, Managua, Nicaragua
PH: 505.249.6986, FAX: 505.249.2764, ineter@ibw.com.ni

World Bank CMAT / PAAR Rural Lands Administration Project:
Peter Joseph Marcel Franssen, Gerente de Produccion
PH: 504.772.4355, FAX: 504.772.4366,
FRANSSEN@sdnhon.org.hn

For problems concerning the technical adequacy of the project:
Stephen J. Frakes, Chief, N/NGS21
PH: 301.713.3194, Steve.Frakes@noaa.gov

For problems concerning survey field operations:
William T. McLemore, Jr., Chief, N/NGS41
PH: 301.713.3215, Bill.Mclemore@noaa.gov

For problems concerning vector processing:
Juliana Blackwell, N/NGS41
PH: 301.713.3215, Juliana.Blackwell@noaa.gov

For problems concerning CORS data:
Neil Weston, N/NGS6
PH: 301.713.2847, Neil.D.Weston@noaa.gov

For problems concerning adjustment processing:
Maralyn L. Vorhauer, N/NGS4
PH: 301.713.3176, Maralyn.Vorhauer@noaa.gov

EXPENSES:

Travel and per diem are authorized in accordance with Federal Travel Regulations, Part 301-11, Per Diem Allowances. Current foreign per diem rates were effective November 1, 2000. Charge all project expenses to the task numbers listed above.

cc: N/NGS - D. Zilkoski
N/NGS - S. Misenheimer
N/NGS1 - G. Mitchell
N/NGS11 - S. Cofer
N/NGS2 - D. Doyle
N/NGS21 - S. Frakes
N/NGS21 - D. Hendrickson
N/NGS22 - T. Soler
N/NGS3 - E. Allen
N/NGS4 - E. Wade
N/NGS4 - M. Vorhauer
N/NGS4 - D. Hoar
N/NGS41 - W. McLemore
N/NGS41 - J. Blackwell
N/NGS412 - C. Middleton
N/NGS5 - R. Snay
N/NGS6 - N. Weston
FGCS Members
Noé Pineda Portillo
Ing. Claudio Gutiérrez Huete
Peter Joseph Marcel Franssen

**DATA TO BE SENT TO N/NGS4 RELATING TO THE
ADJUSTMENT PORTION OF FBN/CBN PROJECTS:**

SOFTWARE OUTPUTS, ASCII FORMAT:

1. COMPGB *
2. OBSCHK *
3. OBSDES *
4. CHKDDDESC *

DATA FILES, BLUEBOOK FORMAT:

1. Final B-file with 86 records from GEOID99 software.
2. Final G-file with 25 and 27 records.
3. Final D-file
4. Final combined Blue Book file
5. Constrained horizontal adjustment **
6. Free ITRF adjustment ***

* Explain any software output errors or warning messages.

** Constrain NGS CORS positions and ellipsoidal heights.

*** Final adjustment on UNIX: Include "plotres_prompt.bsh"
plots from a UNIX server with postscript printer. The
output file (long.out) contains a list of residuals which
may be sorted using the following UNIX commands:

```
vi long.out
:1,$ !sort +0.47 (sorts horizontal residuals)
:1,$ !sort +0.71 (sorts vertical residuals)
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